

REMARKS

Reconsideration and withdrawal of the rejections of this application and consideration and entry of this paper are respectfully requested in view of the herein remarks, which place the application in condition for allowance.

I. STATUS OF CLAIMS AND REQUEST FOR REJOINDER

Claims 1-19 are pending in this application. The applicants thank the Examiner for indication of allowable subject matter in this Office Action (i.e. claims 7-10, 13 and 14).

Claims 13 and 18 have been amended to correct typographical errors (an extra "and" was deleted in claim 13 and an inadvertent period prematurely ended claim 18 - see page 60, line 5 and page 66, line 14 of the original claims). Claims 15-19 are withdrawn from consideration. It is believed that no new matter has been added.

It is submitted that the claims, herewith and as originally presented, are patentably distinct over the prior art cited in the Office Action, and that these claims were in full compliance with the requirements of 35 U.S.C. § 112. The amendments of the claims, as presented herein, are not made for purposes of patentability within the meaning of 35 U.S.C. §§ 101, 102, 103 or 112. Rather, these amendments and additions are made simply for clarification and to round out the scope of protection to which Applicants are entitled.

II. THE 35 U.S.C. 102 REJECTIONS HAVE BEEN OVERCOME

Note for Examiner: As the applicants believe that claims 1-14 are not anticipated (or rendered obvious) by Chan or Ng et al., this query is rendered moot if claims 1-14 are held allowable.

However, should the rejections be maintained, the applicants wish to point out that a claim for foreign priority (though not yet perfected) over JP 2003-001486 which was filed on January 7, 2003 was made for this U.S. application. Should the applicants perfect the claim for priority, the Ng et al. reference (filed May 1, 2003) would no longer qualify as prior art under 35 U.S.C. 102 and the rejection of claims 1-4 over Ng et al. would have to be withdrawn regardless of the merits of the teachings.

Since withdrawal of the Ng et al. rejection would mean that there are no other rejections on the record for claim 3, it is believed that claim 3 should

be held allowable if rewritten in independent form or the next Office Action would have to be made non-final if a new ground of rejection is made for claim 3.

Turning our attention to the anticipation rejections of record, it is noted that MPEP 2131 illustrates the requirements necessary to establish anticipation:

- (1) “ ‘A claim is anticipated only if each and every element set forth in the claim is found, either expressly or inherently described, in a single prior art reference.’ see *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)”; and
- (2) “ ‘The identical invention must be shown in as complete detail as is contained in the...claim.’ see *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).”

For the reasons given below, neither the Chan nor the Ng et al. references anticipate the applicants’ claimed invention.

A. Claims 1, 2, 5, 11 and 12 were rejected as being allegedly anticipated by Chan (U.S. Patent No. 6,518,173)

- (i) With regard to claims 1 and 2, attention was directed to Fig. 6 which allegedly taught at least two wiring layers (11, 22) and a via contact (15) formed between the at least two layers and made of a metal wiring material which is the same as that of the at least two wiring layers (copper) wherein the metal wiring material of the via contact contains an additive (Cr) which is not contained in the metal wiring materials of the at least two wiring layers.

The applicants traverse the Examiner’s statement as underlined above. Contrary to the Examiner’s interpretation, Chan only discloses a **lining layer** (17) composed of Cr, Ta or a Ta-based material for lining internal surfaces of the through-holes (14). This lining layer is not an additive but an electronically conductive adhesion/barrier layer for the copper based via plug (15). This is clearly taught in col. 5, lines 50-54 - “Thin layer (17) shown as lining the internal surfaces of the through-hole 14 formed in second and third dielectric layers 12, 13 acts as an electrically conductive adhesion/barrier layer for the Cu-based via plug (15), and as before, may be comprised of Cr, Ta, or a Ta-based material.”

As thin layer (17) is an independent layer from the Cu-based via plug (15) and does not correspond to the additive recited in claim 1, “each and every element set forth in the claim” is not taught and at the very least is not “shown in as complete detail as is contained in the claim”. Therefore, claim 1 (and likewise claim 2) is not anticipated by Chan.

- (ii) With regard to claim 5, attention was also directed to Fig. 6 which allegedly taught at least two wiring layers (11, 22) and a via contact formed between the at least two layers and made of a metal wiring material (Cu) which is the same as that of the at least two wiring layers, wherein metal wiring materials of the at least two wiring layers contain at least one additive (Ta), and a metal wiring material of the via contact contains at least two additives (Ta based compound) which include an additive (Ta) which is the same as that contained in the metal wiring materials of the at least two wiring layers.

The basis for the applicants’ response is similar to that in section II.A.(i) above, i.e., as thin layer (17) is an independent layer from the Cu-based via plug (15) and does not correspond to the additive recited in claim 5, “each and every element set forth in the claim” is not taught and at the very least is not “shown in as complete detail as is contained in the claim”. Therefore, claim 5 (and likewise claim 6) is not anticipated by Chan.

- (iii) With regard to claims 11 and 12, attention was also directed to Fig. 6, which allegedly taught a first metal wiring layer (11) made of a first wiring material (Cu), formed in a first wiring groove formed in a first insulating film (12) on a semiconductor substrate (8); a second insulating film (13) on the first insulating film having the first wiring layer embedded therein; a via contact (15) embedded in a via hole formed in the second insulating film, the via contact being made of the same wiring material as the first wiring material, which contains an additive (Cr) which is not contained in the first wiring material of the first wiring layer; a third insulating film (19) on the second insulating film having the via contact

formed therein; and a second metal wiring layer (22) embedded in a second wiring groove formed in the third insulating film, the second metal wiring layer being made of the same material as the metal wiring material of the first metal wiring layer.

The basis for the applicants' response is similar to that in section II.A.(i) above, i.e., as thin layer (17) is an independent layer from the Cu-based via plug (15) and does not correspond to the additive recited in claim 11, "each and every element set forth in the claim" is not taught and at the very least is not "shown in as complete detail as is contained in the claim". Therefore, claim 11 (and likewise claim 12) is not anticipated by Chan.

B. Claims 1-4 were rejected as being allegedly anticipated by Ng et al. (U.S. Patent No. 6,852,605 - "Ng")

With regard to claims 1 and 2, the Examiner interpreted Ng to disclose a semiconductor device comprising at least two wiring layers (20, 50); a via contact (36) formed between the at least two layers and made of a metal wiring material which is the same as that of the at least two wiring layers (copper); wherein the metal wiring material of the via contact contains an additive (A1) which is not contained in the metal wiring materials of the at least two wiring layers.

However, contrary to Examiner's assertion, Ng does not disclose that the metal wiring material of the via contact contains an additive (A1) which is not contained in the metal wiring materials of the at least two wiring layers. Ng only discloses that, as the metal wiring material of the via contact (36), other than copper exemplified in the embodiment, aluminum, aluminum-copper alloy, gold, and/or silver can be used. For example, col. 5, lines 62-64 states that "Although copper is used in the preferred embodiment, other conductor metals composing aluminum, aluminum-copper ally, gold, and/or silver can be used." The Examiner appears to consider that the aluminum-copper alloy is used as the metal wiring material (copper) of the via contact containing an additive (aluminum (A1)) but this is a misinterpretation of the teachings of the prior art and the applicants' claimed invention, i.e., the aluminum-copper alloy is an alloy, not an additive in the construct of Ng's invention and would be recognized as such by one of

ordinary skill in the art. Since each element of the applicants' claimed invention has not been taught and at the very least was not described in as complete detail as is contained in the claim, there is no basis for a holding of anticipation and therefore this rejection can be withdrawn.

III. THE 35 U.S.C. 103 REJECTION HAS BEEN OVERCOME

Claim 6 was rejected as allegedly being obvious over Chan, *ibid*. The applicants request reconsideration for the following reasons.

MPEP 2143.03 states in part that "To establish *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)."

As this part of the rejection of Chan only addresses the difference with between the use of Ta (Chan) and Ti (part of applicants' claim 6), the remaining differences between Chan and the applicants' invention as described in the applicants' response to the anticipation rejection (section II above) are not addressed and for this reason alone there can be no holding of obviousness as all claim limitations are not taught or suggested by Chan.

Even if Chan had been an anticipatory reference, there was no basis from within the teaching of Chan to make the "well known" substitution suggested by the Examiner nor is there any evidence that Examiner's stated motivation for substitution emanated from the prior art teaching. MPEP 2143.01 establishes that "The mere fact that references can be combined or modified ***does not render the resultant combination obvious unless*** the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)." In addition, as there is no supporting evidence for the Examiner's statement that it was well known to substitute Ti for Ta, the Examiner appears to be taking Official Notice by making this statement. Therefore, as per MPEP 2144.03, the applicants request documentation evidence which supports the Examiner's conclusion that Ta and Ti are interchangeable in the context of semiconductor devices.

REQUEST FOR INTERVIEW

In the interest of adhering to the tenets of compact prosecution and obtaining good customer service (see page 7 of the FY-2004 Performance and Accountability Report), the applicants request that the teachings of MPEP 707.07(j), sections II and III be applied, especially with regard to the offer of suggestion for correction by the Examiner if the rejections are upheld.

In accordance with MPEP 713.01, section III, should any issue remain as an impediment to allowance, an interview with the Examiner and SPE are respectfully requested; and, the Examiner is additionally requested to contact the undersigned to arrange a mutually convenient time and manner for such an interview ("An interview should normally be arranged for in advance, as by letter, facsimile, electronic mail, telegram or telephone call, in order to insure that the primary examiner and/or the examiner in charge of the application will be present in the office." *Id.*).

CONCLUSION

In view of the remarks and amendments herewith, the application is believed to be in condition for allowance. Favorable reconsideration of the application and prompt issuance of a Notice of Allowance are earnestly solicited. The undersigned looks forward to hearing favorably from the Examiner at an early date, and, the Examiner is invited to telephonically contact the undersigned to advance prosecution. The Commission is authorized to charge any fee occasioned by this paper, or credit any overpayment of such fees, to Deposit Account No. 50-0320.

Respectfully submitted,
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